

CHAPTER 7. COAST GUARD RADIOLOGICAL HEALTH PROGRAM

A. Purpose.

1. Minimize X-Ray Health Risks. According to the National Research Council, "medical diagnostic radiology accounts for at least 90 percent of the total radiation dose to which the U.S. population is exposed." The purpose of this section is to minimize x-ray health risk at Coast Guard medical diagnostic radiology facilities and at all other facilities that have the potential of generating x-rays.
2. Responsibilities. This chapter states the responsibilities of Coast Guard health care facilities and other facilities where x-ray exposure may occur, and procedures these facilities are to use in minimizing personnel exposure to x-rays.

B. Policy. The policy of the program is to keep x-ray exposures as low as reasonably achievable (ALARA) and to ensure that the authorized limits are not exceeded.

C. Authority.

1. The principal laws affecting Coast Guard facilities having the capability of generating x-rays are:
 - a. Public Law 90-602, Radiation Control for Health and Safety Act.
 - b. The Consumer-Patient Radiation Health and Safety Act of 1981 (42 USC 10001, et seq.).
 - c. Public Law 91-596, Occupational Safety and Health Act of 1970, as amended (29 U.S.C. 651).
2. Regulations and Other Directives.
 - a. Executive Order (FR Doc. 78-2776), Radiation Protection Guidance to Federal Agencies for Diagnostic x-rays.
 - b. 10 CFR 20, Standards for Protection Against Radiation.
 - c. 21 CFR Subchapter J, Part 1000 to 1050.
 - d. 29 CFR 1910.96, OSHA Safety and Health Standards.
 - e. HHS Publication FDA 82-8193 - United States Public Health Service Personnel Monitoring Program.

7-C-2. f. HEW Publication FDA 76-8043 - Photographic Quality Assurance in Diagnostic Radiology, Nuclear Medicine, and Radiation Therapy. Vol. I, The Basic Principles of Daily Photographic Quality Assurance, 1979.D

D. Definitions. The following definitions apply to terms used in this chapter:

1. Absorbed Dose. The amount of energy imparted to matter by ionizing radiation per unit mass of irradiated material. The special units of absorbed dose are the rad and grey. The rem (roentgen equivalent man) is the older unit. It represents an energy deposition of 0.01 joules/kilogram of material. The gray (Gy) is the newer unit that ultimately will replace the rad. $1 \text{ Gy} = 100 \text{ rad}$.
2. Activity. The number of nuclear disintegrations per second from a radioactive source. The older unit of activity is the curie. It is defined as 3.7×10^{10} nuclear disintegrations per second. The newer unit is the becquerel (Bq). The Bq ultimately will replace the curie. It is defined as 1 nuclear disintegration per second.
3. Background Radiation. Ionizing radiation arising from sources other than the one directly under consideration. Radiations are always present due to cosmic rays and natural radioactivity of substances in the earth and building materials.
4. Becquerel (Bq). See activity.
5. Calendar Quarter. A three month period of time. The first quarter starts on 1 January; second quarter 1 April; third quarter 1 July; and fourth quarter 1 October.
6. Controlled Area. A defined area in which control is exercised over the occupational exposure of personnel to ionizing radiation.
7. Curie. See activity.
8. Dose Equivalent. The quantity used to express on a common scale the amount of biological damage in humans caused by absorption of different types of ionizing radiation. The units of dose equivalent are the rem (roentgen equivalent man) and the sievert (Sv). The rem is the older unit. It is defined as absorbed dose (rad) $\times Q$. Q is a quality factor which reflects the ability of different types of radiation to cause damage to human tissue. Sv is the newer unit that ultimately will replace the rem. $1 \text{ Sv} = 100 \text{ rem}$.

- 7-D-9. Dosimeter. An instrument used for measuring or evaluating the absorbed dose, exposure, or similar radiation quantity.
10. Exposure. A measure of the ionization produced in air by x or gamma radiation. The special unit of exposure is the roentgen.
11. Gray. See absorbed dose.
12. High Radiation Area. Any area, accessible to personnel, in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose equivalent in excess of 100 millirem.
13. Ionizing Radiation. Any electromagnetic or particulate radiation capable of producing ions, directly or indirectly, in its passage through matter. Alpha and beta particles, gamma rays, x-rays, and neutrons are examples of ionizing radiation.
14. Millirem. A submultiple of the rem equal to one one-thousandth ($1/1000$ th) of a rem see dose equivalent.
15. Occupationally Exposed Individual. An individual whose work is normally performed in a controlled area, or whose duties involve exposure to radiation and who is subject to appropriate radiation controls. Occupational exposure does not include the exposure of an individual to sources of ionizing radiation for the purpose of medical or dental diagnosis or therapy.
16. Protective Apron. An apron made of radiation absorbing material, used to reduce radiation exposure.
17. Protective Barriers. Barriers of radiation absorbing material, such as lead, concrete, plaster, and plastic, that are used to reduce radiation exposure.
- a. Protective Barriers, Primary. Barriers sufficient to attenuate the useful beam to the required degree.
- b. Protective Barriers, Secondary. Barriers sufficient to attenuate stray or scattered radiation to the required degree.
18. RAD (Radiation Absorbed Dose). See absorbed dose.
19. Radiation Area. Any area, accessible to personnel, in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose equivalent in excess of five millirem or in any five consecutive days a dose equivalent in excess of 100 millirem.

7-D- 20. Radiation Safety Officer. An individual who has the knowledge and responsibility to apply radiation protection regulations.

21. Radiation Sources. Materials, equipment, or devices that generate or are capable of generating ionizing radiation, including naturally occurring and accelerator produced radioactive materials; fission products; materials containing induced or deposited radioactivity; nuclear reactors; radiographic and fluoroscopic equipment; particle generators and accelerators, klystron, magnetron, rectifier, cold-cathode tubes, and other electron tubes operating above 10 kV; x-ray diffraction and spectrographic equipment; electron microscopes; and electron-beam welding and melting devices.

22. Radiation Worker. See occupationally exposed individual.

23. REM (Roentgen Equivalent Man). See dose equivalent.

24. Sievert. See dose equivalent.

25. Thermoluminescent Dosimeter. A dosimeter made of certain crystalline material that is capable of both storing a fraction of absorbed ionizing radiation and releasing this energy in the form of visible photons when heated. The amount of light released can be used as a measure of radiation exposure to these crystals.

E. Responsibilities.

1. Contractor. The Public Health Service provides personnel dosimeter badges to each of its participating facilities through a contract with a commercial supplier of personnel monitoring services.

a. Requirements. The contractor is required to:

- (1) Provide personnel badges to participating facilities only where authorized do so by the PHS Project Manager.
- (2) Send new badges to each facility in time to arrive at least seven days before the beginning of the next monitoring period.
- (3) Make additions, deletions, or changes to the program promptly, only when instructed to do so by the PHS Project Manager.
- (4) Provide radiation dosimetry reports to each participating facility and the PHS Project Manager.

- 7-E-1. a. (5) Promptly notify the facility and the PHS Project Manager of abnormally high exposures or overexposures.

2. Center for Devices and Radiological Health. The Center has a contractual agreement with the Coast Guard to provide:

- a. Personnel monitoring support through the USPHS Film Badge Program Project Manager, Center for Devices and Radiological Health, Rockville, MD.
- b. Technical radiological health support through the radiological health officers located at the USPHS regional offices and at the Center for Devices and Radiological Health, Rockville, MD.

3. Commandant (G-KSE) Responsibilities.

- a. Establishing and promulgating policies, procedures and standards for Coast Guard medical diagnostic x-ray facilities.
- b. Serving as the Coast Guard liaison with the USPHS, FDA, and Center for Devices and Radiological Health in their support of the program.

4. MLC Commander (k) Responsibilities.

- a. Ensuring compliance with this section of each facility having medical diagnostic x-ray capability.
- b. Providing health assessment support to Coast Guard facilities with medical diagnostic x-ray capability.
- c. Providing health assessment support to Coast Guard facilities with potential x-ray exposures from nonmedical sources.

5. Senior Medical Officer/Supervising Medical Officer Responsibilities. The senior medical officer or designated supervising medical officer of each health care facility with medical diagnostic x-ray capability is responsible for:

- a. Compliance with all provisions of this section.
- b. Designating in writing a Radiation Safety Officer, who must be a technically qualified person responsible for the daily operation of the program. This person should have a basic knowledge of radiation safety practices and procedures.

- 7-E-5. c. Informing Commandant (G-KSE-3) in writing, via the MLC commander, whenever new x-ray equipment is installed, existing x-ray equipment is moved to a different location, new x-ray facilities are constructed, or existing x-ray facilities are renovated.
- d. Using the personnel monitoring program provided to the Coast Guard by the USPHS Center for Devices and Radiological Health.

6. Radiation Safety Officer Responsibilities.

- a. Ensuring compliance with this chapter of the personnel dosimeter quality assurance and personnel monitoring programs.
- b. Ensuring adherence to the quality assurances contained in HEW Publication FDA. 76-8043.
- c. Receiving dosimeters from the contractor and making proper distribution to individuals in the program.
- d. Collecting dosimeters promptly at the end of the monitoring period and shipping them to the contractor for analysis.
- e. Promptly sending requests for additions, deletions, or changes to the personnel monitoring program via MLC commander (k) to:

Project Manager
USPHS Personnel Monitoring Program
HFX-3
Center for Devices and Radiological Health
5600 Fishers Lane (HFX-320)
Rockville, MD 20857

- f. Ensuring instruction of each dosimeter wearer in its purpose and proper use.
- g. Ensuring understanding by individuals assigned a dosimeter that they are responsible for the proper use, loss of, or damage to the personnel dosimeter which is issued. Deliberate exposure or other improper use of a dosimeter constitutes falsification of an official record resulting in the need for an investigation and possible disciplinary action.
- h. Annual advisement of the accumulated radiation dose for the previous calendar year to each individual assigned a dosimeter. All women of child bearing age will be advised of the potential hazards of x-ray

- 7-E-6. h. (cont'd) exposure to unborn children as described in enclosure (12). She is required to sign a statement that she has been so briefed. A copy of that statement will be attached to her fourth quarter dosimeter report and retained in her health record.
- i. Maintaining all quality assurance and personnel monitoring records and dosimetry reports.
- j. Reviewing radiation reports for unusual exposures, investigating to determine the cause, and reporting conclusions to Commandant (G-KSE-3) via MLC commander (k).
- k. Ensuring evaluation of medical diagnostic x-ray equipment by the Regional Radiological Health Representatives (RRHR) at least once every two years.
- l. Ensuring further evaluation whenever:
- (1) New x-ray equipment is installed.
 - (2) Existing x-ray equipment is moved to a different location.
 - (3) New x-ray facilities are constructed.
 - (4) Existing x-ray facilities are renovated.

7. Personnel Using Diagnostic X-Ray Equipment.

a. General.

- (1) A personnel dosimeter shall be issued to and worn by each person who routinely works in a radiation area, or who must enter a radiation area regularly in the course of his or her duties.
- (2) Personnel dosimeters shall be worn at all times when the individual is in an area where sources of ionizing radiation (x-ray machines or radioactive materials) are used.
- (3) Each personnel dosimeter contains an identification label. The facility account number contains five digits. The "30" identifies badges assigned to the PHS Personnel Monitoring Program. The remaining three digits (e.g., 399) are the facility's number.

F. Personnel Dosimeter Program. Enclosure (11) contains requirements for implementing a personnel dosimeter program.

7-G. Privacy Act. The Public Health Service is required by the Privacy Act of 1974 to provide the following information to individuals participating in the PHS Personnel Monitoring Program:

1. Radiation Protection Program Personnel Monitoring System (Federal Register, Volume 42, No. 189, September 29, 1977) is the designated system of records in which information provided by individuals is maintained. Authority for maintenance of this system of records is the Atomic Energy Act of 1954 (68 Stat. 919 et seq.) as amended (42 U.S.C. 2073, 2093) and the Occupational Health and Safety Act of 1974. The authority for soliciting the social security number is Title 10, Code of Federal Regulations, Part 20.
2. The Department of Health and Human Services uses the information to record and evaluate the radiation exposure of employees who are occupationally exposed to ionizing radiation. Individuals monitored under this program will be provided with their radiation history upon request. See enclosure (11). The information may be used to provide data to the individual's employer and to other Federal and State agencies involved in monitoring and evaluating radiation exposures to employees. Information may also be provided in the course of an administrative or judicial proceeding.
3. It is voluntary on the part of the employee to furnish the requested information including the social security number. However, if the necessary information is not provided, an individual may be denied employment in an occupation involving exposure to ionizing radiation. The social security number is essential in order to positively identify those persons on whom radiation exposure information is maintained.
4. The Project Manager, PHS Personnel Monitoring Program, is the system manager.